

A review on Construction and demolition waste management in India

Ganesh V. Tapkire¹

(Assistant professor) Department of Civil Engineering

R. C. Pate institute of Technology, Shirpur (Maharashtra.)-425405

Abstract- In developing country construction is an important aspect of infrastructure. for providing the basic facilities to users in country. Government and private sector take initiative in construction industry. Due to the growth in infrastructure produces the large amount of construction and demolition waste and this waste currently use for land filling and open dumping along roadsides and in water bodies are the dominant C&D waste management practices. But which is harmful in human and environment. In this paper we are going to review major source and factors of generating construction and demolition waste and also the sustainable waste management hierarchy is studied to overcome the waste management problem.

Keywords: Construction and Demolition, waste management

I. INTRODUCTION

The construction sector in India is growing rapidly. The boom in the construction market is fueled by increasing urbanization and rising per capita income of the people. The rise of the sector has significantly benefited the growth of the Indian economy. government also launch every five year plan major focus on to provide the infrastructure facility to users it is very important but this development required large quantity of material like cement, sand, aggregate, and other construction material. Nowadays we found the shortage of material and increase rate of material also many city in India. And parallel construction and demolition waste also increase in many cities. This C&D waste material are increasingly becoming a major issue in urban solid waste management. From the secondary data information collects from various research papers and international reports on C&D waste management. Some information collected through waste management agencies As per the Planning Commission, the contribution of the construction industry to India's GDP increased by INR 1 billion (USD 15 million) during 2006-2011. With a current contribution of 8% to India's GDP, the sector is the second largest in terms of employment generation after agriculture. The Planning Commission forecasts for the market size of the construction industry for the Twelfth Plan period indicate that the aggregate output of the industry during the period 2012-13 to 2016- 2017 is likely to be INR 5.2 trillion (USD 782 billion) (Planning Commission, 2013). The output of the industry is likely to be contributed almost equally by the buildings and infrastructure segments respectively. In view of this, India's Planning Commission has doubled the proposed spending on buildings and infrastructure in the Twelfth Five Year Plan (Figure -1)

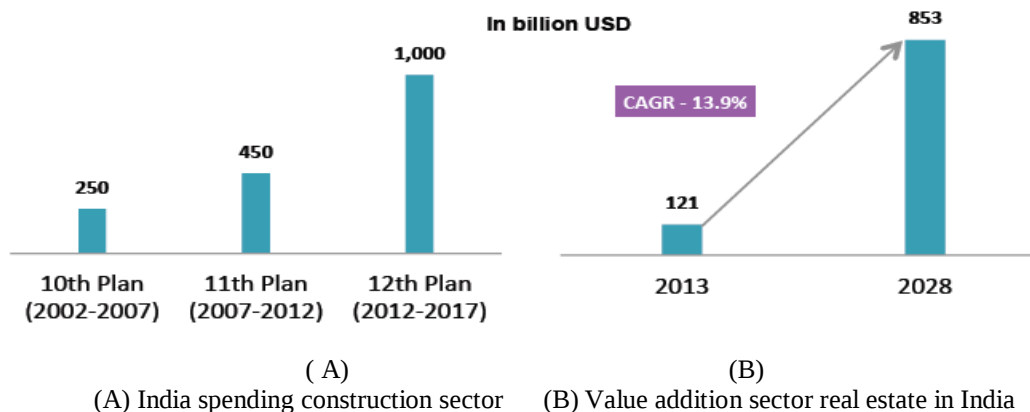


Figure-1 (source KPMG 2014)

In India, about 31.2% of the total population is currently living in urban areas (Census of India, 2011). The increase in urban population from 2001 to 2011 was more than double as compared to the increase in rural population in the same period. It is expected that the urban population will be equal to the rural population by the year 2039 (Figure 3.38). The per capita income in fast growing cities will increase 4 times by 2030 using 2008 as the base year (McKinsey Global Institute, 2010). All these are clear indicators that the construction sector will see a steep rise in the future and play an important role in India's development.

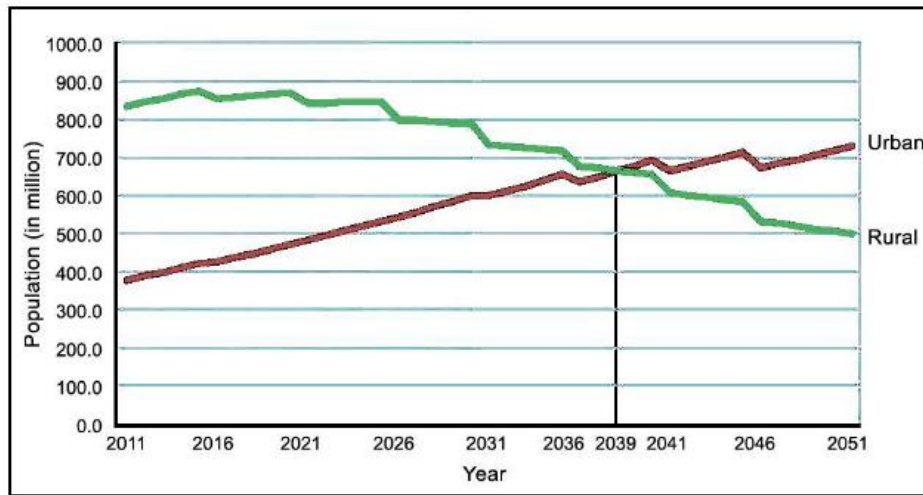


Figure-2 Projection of rural and urban Population in India (source censuses of 2011)

To meet the expected growth of the construction sector, huge volumes of materials will be required. Sand (concrete and mortar), soil (bricks), stone (aggregates), limestone (cement) and iron and steel (bars and rods) are the most intensively used materials for building and construction purposes. Some of these materials are already facing scarcity issues. The extraction and use of these materials also has associated environmental and social impacts.. Material flow also gives an opportunity to assess the flow of waste that comes out during construction and at the end of life of buildings.

II- Components of C and D Waste

C and (Construction and Demolition) waste is defined in slightly different ways by different countries. For the purpose of this study, the definition used by the Ministry of Environment and Forests, Government of India is being adopted. As per the Notification S.O.908(E) dated the 25th September 2000 issued by MoEF, the C and D) "Construction and Demolition waste" means wastes from building materials debris and rubble resulting from construction, re-modeling, repair and demolition operation. In most cases 'Construction and Demolition' waste are coupled together but there are differences between demolition and construction waste. Waste may be categorized into two groups: 1) Construction waste 2) Demolition waste

Construction waste components	
Component	Material Description
Excavated earth	Earth accumulated due to excavation work for foundation
Wood	New wood includes plywood, chip wood, shaving sand sawdust
Masonry	Inert materials like brick, concrete, rock and dirt, etc
Metal	consisting metal studs, reinforcement bars, beams, pipes, etc.
Plastic	including PVC pipes, doors, insulation material, plastic sheet, etc.
Glass	Very less quantity if broken
Others	which is not included in to the list mentioned above

Table-1

Demolition waste components	
Excavated earth	Earth mixed with foundation material
Wood	wood typically painted and attached to some other materials
Masonry	Inert materials like brick, concrete and dirt etc
Metal	Metallic materials consisting metal studs, beams, pipes, etc
Plastic	including PVC pipes, doors, insulation material, plastic sheet, etc.
Glass	Glass mostly broken and in fixed condition along with doors/windows
Others	which is not included in to the list mentioned above

Table-2

Total C & D Waste in India

There is no general agreement regarding the total volume of construction and Demolition waste generated annually in India till date TIFAC calculation for waste from the construction industry accounting for 25% of solid waste or 12–15

million tons per annum. The data in TIFAC study report in 2001 found to be quite an underestimated amount by several researchers time to time.

Generation of C & D Waste by different city in India	
City	Annual C and D generation (Million tones/annum)
Mumbai	0.75
Delhi	1.38
Bengaluru	0.26
Chennai	0.75
Kolkata	0.48
Jaipur	0.06
Patna	0.08

Table-3

III- Literature survey

Researchers around the world have reported the quantity of C&D waste generated in different economies. It is reported that the US is generating over 100 million tons of C&D waste annually (Yuan H. and Shen L., 2011). In the UK, C&D waste contributes more than 50 % of overall landfill volume. In Hong Kong, researchers have reported that around 20 million tons of C&D waste was generated in 2004. These values are in absolute terms and hence the general public can easily understand the severity of the C&D waste arising out of construction related activities. Researchers have also reported the percentage of C&D waste in the total municipal solid waste. Construction activities generate about 20 % to 30 % of all waste that enters Australian landfills (Yuan H. and Shen L., 2011). Tam et al, 2008 mentioned that C&D waste forms 19 % and 14 % of the waste disposed of at landfills in Germany and Finland respectively, while in Hong Kong, it is about 23 %. However, these comparisons should be treated with caution because the percentage is influenced by not only construction but also other factors such as economy scale, population, territory, and behaviors in managing waste etc. In order to have a comparable indicator in different economies, researchers introduced waste generation rate (WGR). Waste Generation Rate (WGR) serves as valuable quantitative information for Bench marking various C&D waste management practices. Thus data regarding generation of C&D waste is of utmost importance for the success of waste management. Many of the researchers have also pointed out that investigation of the amount of demolition waste getting generated, in particular, for developing economies is one of the major themes that have to be further explored. Studies indicate that relatively less research attempts have been made at investigating the quantity of demolition waste, even though the demolition activities have made a greater contribution to the generation of C&D waste than construction activities. Furthermore, due to rapid urbanization and insufficient attention to waste generation in developing economies during the past decades (such as China and Malaysia), statistical data regarding the amount of waste generation is currently scarce in these countries.

VI - Overview of C & D Waste Management

Asian countries Asian institute of technology, Thailand had conducted a survey in various Asian countries and prepared a report regarding the construction and demolition waste management in May 2008. The study includes Asian countries like Bhutan, Japan, Hong-Kong SAR, China, Thailand and others including India[2]. The following ie chart shows the status of construction and demolition waste in Asian countries. Figure 1 shows the status of construction waste in Asian countries.

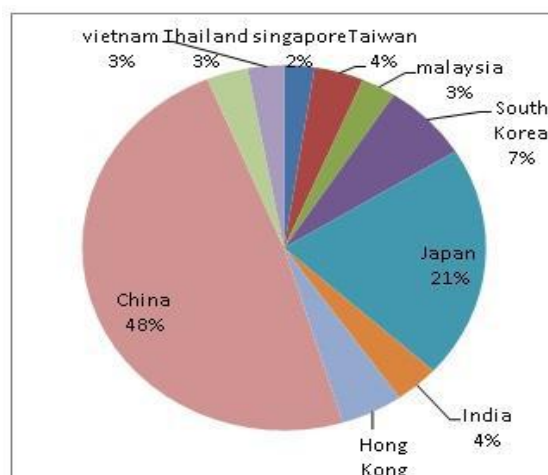


Figure-4

Estimates of C&D Wastes in Some Asian countries (Asian Institute of Technology, 'Report on reduce, reuse and recycle (3R) practices in C&D waste management in Asia.

In general 90-95 % of the total construction material waste can be recycled and recycling of construction material can reduce the load on landfills which is around 25% of the total waste generation in India. However little has been done to manage and utilize C & D waste in scientific manner. More often private contractors remove C&D waste to privately owned low laying land for a price or dump it in unauthorized manner along the roads or other public land this increase to serve pressure on urban land is resulting to reducing life span of landfill earlier, as per Indian laws to permitted the use of only naturally source building material. The IS: 323-1970 Indian standard specification and(BIS)Bureau of Indian standard stipulated that for concrete made only with naturally accessed material. Thus construction agency cited this rule to avoid using recycled material. However, Municipal Solid Waste (Management and Handling) Rules, 2000 and the Jawaharlal Nehru National Urban Renewal Mission (JNNURM) programmed of the Ministry of Urban Development laid special emphasis on MSW management. From this study we need to develop the special guideline for recycled material used in regular construction there have been some initiatives across the country that is worth mentioning albeit having a small impact. The Building Material and Technology Promotion council (BMTPC), an apex body that innovative building material and technologies has scheme called Performance Appraisal Certification Scheme (PACS) new products manufactured by using recycled waste in fact, any new product, system or technique not covered so far by the BIS can be certified under this scheme after evaluation. It has been used to certify new construction material.

V - C&D Waste Reduction and Reuse

Waste Reduction is considered as the most effective and efficient method for managing C&D waste. It can not only minimize the generation of C&D waste, but also reduce the cost for waste transporting, disposal and recycling (Poon, 2007; Esin and Cosgun, 2007). As the highest priority for managing C&D waste, it is not surprising that reduction has been examined extensively by many researchers. These studies have developed various solutions for waste reduction, which can be generally summarized in to five categories (Esin and Cosgun, 2007; Begum et al., 2007; Tam et al., 2006), encompassing: (1) reducing waste through government legislation; (2) reducing waste by design; (3) developing an effective waste management system (WMS); (4) use of low waste technologies; and (5) improving Practitioners attitude towards waste reduction. During the past few decades, considerable efforts have been devoted to dealing with barriers and strategies of C&D waste management in developed countries, such as the USA, the UK, Germany and Japan. However, the barriers and strategies for managing C&D waste in developing countries are lagging far behind and hence must be explored in the future problems that would be encountered in practice is still an unsolved question. Therefore, development of approaches that can examine the effectiveness of different C&D waste management strategies is probably a promising research direction in the future Research efforts on C&D waste reuse is relatively less than that on C&D waste reduction, although they are considered among the three basic principles of C&D waste management, the third one being C&D waste recycling. Literature reveals that this is probably because the generated waste will be reused actively by contractors only when they realize that benefits can be obtained from doing so. It indicates that waste reuse depend highly on the practitioners, rather than the waste material itself.

VI- Policy Frame work for C&D Waste management

- 1) The preparation of relevant IS Code for recycled material used in regular construction.
- 2) Every new construction and renovation work need to permission from relevant authority fill up the undertaking of C&D waste management strategy.
- 3) Local authorities should issue detailed deconstruction plans and detailed recycling specifications.
- 4) Local authorities should be responsible for arranging the collection, recycling and disposal infrastructure of C&D waste, either on their own, or through other agencies. In such cases, the costs will be borne by the owners.
- 5) There should be charges for disposal in landfills, which should be sufficiently high to encourage processing and recycling of C&D wastes.

VII- CONCLUSION

From the survey of papers need to trends in research on Construction & Demolition waste management. Broad areas of research have been identified and discussed. There is a need for countries like India to take up inter-disciplinary research in all areas related C&D waste management. With the growth of the economy leading to increased construction activity, it is important that this area is addressed in a mission mode to ensure sustainable growth. Also saving the natural material and to provide the new employment filed to worker and developers to develop the recycled or second row material for used in construction industry.

VIII- REFERENCE

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